Stanford



Kevin Boyce

Professor of Earth and Planetary Sciences and, by courtesy, of Earth System Science

Earth & Planetary Sciences

Curriculum Vitae available Online

Bio

ACADEMIC APPOINTMENTS

- Professor, Earth & Planetary Sciences
- Professor (By courtesy), Earth System Science
- Member, Bio-X

ADMINISTRATIVE APPOINTMENTS

- Professor (by courtesy), Biological Sciences, Stanford University, (2019- present)
- Professor, Geological Sciences, Stanford University, (2018- present)
- Associate professor, Stanford University, (2013-2018)
- Associate professor, University of Chicago, (2010-2013)
- Assistant professor, University of Chicago, (2003-2010)
- National Research Council associate, NASA Astrobiology Institute, (2001-2003)

HONORS AND AWARDS

- Phillips Lecture in Paleoscience, University of Illinois Urbana-Champaign (2022)
- Klepser Distinguished Lectureship, University of Tennessee (2015)
- Fellow, MacArthur Foundation (2013-2018)
- W. S. Cooper Award, Ecological Society of America (2012)
- Fellow, Paleontological Society (2011-)
- Charles Schuchert Award, Paleontological Society (2011)
- Postdoctoral fellowship (declined), CIW Geophysical Laboratory (2001)
- Predoctoral fellowship, NSF (1996-1999)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Reviewing editor, PNAS Nexus (2024 - present)
- Member, Ethics Committee, Paleontological Society (2023 - present)
- Editor, Paleobiology (2018 - 2024)
- Member, Fellows Committee, Paleontological Society (2017 - 2019)
- Member, Cooper Award committee, Ecological Society of America (2014 - 2016)
- Extended adviser, Deep Time exhibit, Smithsonian NMNH (2014 - 2015)

- Member, Strimple Award committee, Paleontological Society (2012 - 2015)
- Associate editor, Paleobiology (2011 - 2018)
- Chair, Paleobotanical Section, Botanical Society of America (2006 - 2007)
- Research associate, Geology, Field Museum of Natural History (2004 - 2014)
- Member, Moseley Award committee, Botanical Society of America (2004 - 2006)
- Member, Cookson Award committee, Botanical Society of America (2003 - 2003)
- Predoctoral fellow, Geophysical Laboratory, Carnegie Institution of Washington (1999 - 2001)

PROFESSIONAL EDUCATION

- Ph.D., Harvard University , Organismic & Evolutionary Biology (2001)
- B.S., California Institute of Technology , Literature (1995)
- B.S., California Institute of Technology , Biology (1995)

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

I focus on the initial evolution of complex multicellular life on land in the Paleozoic (542 to 250 million years ago) through the establishment of more modern ecosystems over the Mesozoic (250 to 65 million years ago). I am interested in fossils as the remnants of functioning biological organisms that can inform on the evolution of their physiology, development, and biochemistry. Those organisms preserved in the fossil record were also components of larger ecological and environmental systems and I am particularly interested in how the evolution of physiology and structure would have influenced those larger systems including carbon and other nutrient cycles as well as climate. In practice, my work involves both living and fossil organisms and a wide variety of collaborative approaches: developmental and physiological investigation, modeling of climate and the geological carbon cycle, comparative study of morphological diversity through time, and cell and tissue-specific analysis of fossil elemental, isotopic, and organic chemistry.

My science has been rooted in the plant fossil record and the particular advantages that the anatomical preservation of plant fossils provides for studying physiological and developmental evolution. Over the last decade, my work and that of my students has increasingly come to encompass the complete terrestrial biota including animals, fungi, and microbial communities. My students can expect to develop their own projects and be as much collaborator as apprentice. Applicants are welcome from both geological or biological backgrounds and with interest or expertise in any component of the terrestrial system.

Teaching

COURSES

2026-27

- Confronting the Diversity of Life: The Emergence of Evolution from Exploration: ESF 22A (Aut)
- Confronting the Diversity of Life: The Emergence of Evolution from Tropical Exploration: ESF 22 (Aut)
- Evolution of Terrestrial Ecosystems: EARTHSYS 128, EPS 128, EPS 228 (Win)
- Survey of research in the Earth & Planetary Sciences: EPS 304 (Win)

2025-26

- Confronting the Diversity of Life: The Emergence of Evolution from Exploration: ESF 22A (Aut)
- Confronting the Diversity of Life: The Emergence of Evolution from Tropical Exploration: ESF 22 (Aut)
- Fundamentals of Geobiology: EARTHSYS 205A, EPS 205, ESS 205 (Aut)

- Invisible Curriculum seminar: EPS 305 (Aut)

2024-25

- Confronting the Diversity of Life: The Emergence of Evolution from Exploration: ESF 22A (Aut)
- Confronting the Diversity of Life: The Emergence of Evolution from Tropical Exploration: ESF 22 (Aut)
- Evolution of Terrestrial Ecosystems: BIO 148, BIO 228, EARTHSYS 128, EPS 128, EPS 228 (Win)
- Invisible Curriculum seminar: EPS 305 (Aut)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Kemi Ashing-Giwa, Jack Riley

Postdoctoral Faculty Sponsor

Jessica Orozco

Publications

PUBLICATIONS

- **A shoot at the root? Unique development and evolution of the stigmarian apical meristem.** *Proceedings. Biological sciences*
  D'Antonio, M. P., Boyce, C. K., Donovan, M. P., Herrera, F.
  2026; 293 (2069)
- **Earliest evolution of stipules among vascular plants documented in the late Paleozoic stem group of Marattiales.** *BMC biology*
  Zhou, W., Sun, W., Wang, T., Li, D., Pšenička, J., Hill, C., Boyce, C. K., Wang, J.
  2025; 23 (1): 357
- **Organic geochemical evidence for life in Archean rocks identified by pyrolysis-GC-MS and supervised machine learning.** *Proceedings of the National Academy of Sciences of the United States of America*
  Wong, M. L., Prabhu, A., Alexander, C. O., Cleaves, H. J., Cody, G. D., Hystad, G., Bermanec, M., Bleeker, W., Boyce, C. K., Corpolongo, A., Czaja, A. D., Das, S., Gaines, et al
  2025; 122 (47): e2514534122
- **Structural and physiological constraints on arborescent lycopsid establishment and growth.** *The New phytologist*
  D'Antonio, M. P., Boyce, C. K.
  2025
- **Climbing habit confirmed in the early Permian zygopterid fern Nemejcopteris haiwangii and its palaeoecological significance** *PALAEOGEOGRAPHY PALAEOCLIMATOLOGY PALAEOECOLOGY*
  Li, F., Li, D., Frojdova, J., Psenicka, J., Boyce, C., Wang, J., Zhou, W.
  2025; 675
- **Which arthropods have feet and why? Addressing an argument for aquatic fossil scorpions** *PALAEONTOLOGY*
  Callaghan, S., Boyce, C.
  2025; 68 (5)
- **The Geosiphon-Nostoc symbiosis: recent elaboration, or remnant of an enduring association?** *Annals of botany*
  Nelsen, M. P., Lumbsch, H. T., Boyce, C. K.
  2025
- **Terrestrialization: toward a shared framework for ecosystem evolution** *PALEOBIOLOGY*
  Boyce, C., Nelsen, M. P.
  2025
- **Stigmaria: on the substrate before in the substrate** *PALAEOWORLD*
  D'Antonio, M. P., Breasley, C. M., Pfefferkorn, H. W., Wang, J., Boyce, C.

2024; 33 (4): 925-936

- **Evolution of terrestrial herbivory: nutrient stoichiometry, body size, and dietary diversity** *FRONTIERS IN ECOLOGY AND EVOLUTION*
  Boyce, C.
  2023; 11
- **Linking host plants to damage types in the fossil record of insect herbivory** *PALEOBIOLOGY*
  Schachat, S. R., Payne, J. L., Boyce, C.
  2023; 49 (2): 232-258
- **Macroecological diversification of ants is linked to angiosperm evolution** *EVOLUTION LETTERS*
  Nelsen, M. P., Moreau, C. S., Boyce, C., Ree, R. H.
  2023: 79-87
- **Illusion of flight? Absence, evidence and the age of winged insects** *BIOLOGICAL JOURNAL OF THE LINNEAN SOCIETY*
  Schachat, S. R., Goldstein, P. Z., Desalle, R., Bobo, D. M., Boyce, C., Payne, J. L., Labandeira, C. C.
  2022
- **What we talk about when we talk about the long-term carbon cycle.** *The New phytologist*
  Boyce, C. K., Ibarra, D. E., D'Antonio, M. P.
  2022
- **The preservation of cause and effect in the rock record** *PALEOBIOLOGY*
  D'Antonio, M. P., Ibarra, D. E., Boyce, C.
  2022
- **Diodonopteris virgulata sp. nov., a climbing fern from the early Permian Wuda Tuff Flora and its paleoecology** *REVIEW OF PALAEOBOTANY AND PALYNOLOGY*
  Zhou, W., Li, D., Psenicka, J., Boyce, C., Wang, S., Wang, J.
  2022; 304
- **Nitrogen-based symbioses, phosphorus availability, and accounting for a modern world more productive than the Paleozoic.** *Geobiology*
  Boyce, C. K., Ibarra, D. E., Nelsen, M. P., D'Antonio, M. P.
  2022
- **What to Do with Prototaxites?** *INTERNATIONAL JOURNAL OF PLANT SCIENCES*
  Nelsen, M. P., Boyce, C.
  2022
- **Two new leptosporangiate ferns from in situ volcanic ash of the Whetstone Horizon (Kladno Formation, Pennsylvanian), Pilsen Basin, Czech Republic** *REVIEW OF PALAEOBOTANY AND PALYNOLOGY*
  Psenicka, J., Zhou, W., Boyce, C., Frojdova, J., Bek, J., Oplustil, S., Wang, J.
  2022; 299
- **Generating and testing hypotheses about the fossil record of insect herbivory with a theoretical ecospace** *REVIEW OF PALAEOBOTANY AND PALYNOLOGY*
  Schachat, S. R., Payne, J. L., Boyce, C., Labandeira, C. C.
  2022; 297
- **The impact of vegetation on meandering rivers** *Nature Reviews Earth & Environment*
  Ielpi, A., Lapôtre, M., Gibling, M., Boyce, C.
  2022
- **A new anachoropterid fern from the Asselian (Cisuralian) Wuda Tuff Flora** *REVIEW OF PALAEOBOTANY AND PALYNOLOGY*
  Zhou, W., Psenicka, J., Bek, J., Wan, M., Boyce, C., Wang, J.
  2021; 294
- **Primary tissues dominated ground-level trunk diameter in Sigillaria: evidence from the Wuda Tuff, Inner Mongolia** *JOURNAL OF THE GEOLOGICAL SOCIETY*
  D'Antonio, M. P., Boyce, C., Zhou, W., Pfefferkorn, H. W., Wang, J.
  2021

- **Lepidoptera demonstrate the relevance of Murray's Law to circulatory systems with tidal flow.** *BMC biology*
  Schachat, S. R., Boyce, C. K., Payne, J. L., Lentink, D.
  2021; 19 (1): 204
- **An upright psaroniaceous stump and two surrounding pecopteroids from the early Permian Wuda Tuff Flora** *PALAEOWORLD*
  Zhou, W., D'Antonio, M. P., Boyce, C., Wang, J.
  2021; 30 (3): 451-460
- **Secondary phloem in arborescent lycopsids.** *The New phytologist*
  D'Antonio, M. P., Boyce, C. K.
  2021
- **Maximum CO2 diffusion inside leaves is limited by the scaling of cell size and genome size.** *Proceedings. Biological sciences*
  Théroux-Rancourt, G. n., Roddy, A. B., Earles, J. M., Gilbert, M. E., Zwieniecki, M. A., Boyce, C. K., Tholen, D. n., McElrone, A. J., Simonin, K. A., Brodersen, C. R.
  2021; 288 (1945): 20203145
- **Two new species of Sigillaria Brongniart from the Wuda Tuff (Asselian: Inner Mongolia, China) and their implications for lepidodendrid life history reconstruction** *Review of Palaeobotany and Palynology*
  D'Antonio, M. P., Boyce, C. K., Wang, J.
  2021; 294
- **The macroevolutionary dynamics of symbiotic and phenotypic diversification in lichens.** *Proceedings of the National Academy of Sciences of the United States of America*
  Nelsen, M. P., Lucking, R., Boyce, C. K., Lumbsch, H. T., Ree, R. H.
  2020
- **Land plant evolution decreased, rather than increased, weathering rates** *GEOLOGY*
  D'Antonio, M. P., Ibarra, D. E., Boyce, C.
  2020; 48 (1): 29–33
- **Arborescent lycopsid periderm production was limited.** *The New phytologist*
  D'Antonio, M. P., Boyce, C. K.
  2020
- **The prospects for constraining productivity through time with the whole-plant physiology of fossils** *NEW PHYTOLOGIST*
  Boyce, C., Zwieniecki, M. A.
  2019; 223 (1): 40–49
- **Modeling the consequences of land plant evolution on silicate weathering** *American Journal of Science*
  Ibarra, D. E., Caves Rugenstein, J. K., Bachan, A., Baresch, A., Lau, K. V., Thomas, D. L., Lee, J., Boyce, C., Chamberlain, C.
  2019; 319 (1): 1-43
- **A left-handed fern twiner in a Permian swamp forest.** *Current biology : CB*
  Zhou, W. n., Li, D. n., Pšenička, J. n., Boyce, C. K., Wang, J. n.
  2019; 29 (22): R1172–R1173
- **No support for the emergence of lichens prior to the evolution of vascular plants.** *Geobiology*
  Nelsen, M. P., Lücking, R. n., Boyce, C. K., Lumbsch, H. T., Ree, R. H.
  2019
- **Competition for epidermal space in the evolution of leaves with high physiological rates** *NEW PHYTOLOGIST*
  Baresch, A., Crifo, C., Boyce, C.
  2019; 221 (2): 628–39
- **Fast or slow for the arborescent lycopsids? Response to Thomas & Cleal (2018) 'Arborescent lycophyte growth in the late Carboniferous coal swamps'** *NEW PHYTOLOGIST*
  Boyce, C., DiMichele, W. A.
  2018; 218 (3): 891–93

- **Phanerozoic pO2 and the early evolution of terrestrial animals** *Proceedings of the Royal Society B: Biological Sciences*
  Schachat, S. R., Labandiera, C. C., Saltzman, M. R., Cramer, B. D., Payne, J. L., Boyce, C. K.
  2018; 285
- **The bias of a two-dimensional view: comparing two-dimensional and three-dimensional mesophyll surface area estimates using noninvasive imaging** *NEW PHYTOLOGIST*
  Theroux-Rancourt, G., Earles, J., Gilbert, M. E., Zwieniecki, M. A., Boyce, C., McElrone, A. J., Brodersen, C. R.
  2017; 215 (4): 1609–22
- **Did trees grow up to the light, up to the wind, or down to the water? How modern high productivity colors perception of early plant evolution.** *New phytologist*
  Boyce, C. K., Fan, Y., Zwieniecki, M. A.
  2017
- **Plant Evolution and Climate Over Geological Timescales** *ANNUAL REVIEW OF EARTH AND PLANETARY SCIENCES, VOL 45*
  Boyce, C., Lee, J.
  edited by Jeanloz, R., Freeman, K. H.
  2017; 45: 61–87
- **Stomatal design principles in synthetic and real leaves.** *Journal of the Royal Society, Interface*
  Zwieniecki, M. A., Haaning, K. S., Boyce, C. K., Jensen, K. H.
  2016; 13 (124)
- **Stomatal design principles in synthetic and real leaves** *JOURNAL OF THE ROYAL SOCIETY INTERFACE*
  Zwieniecki, M. A., Haaning, K. S., Boyce, C., Jensen, K. H.
  2016; 13 (124)
- **Delayed fungal evolution did not cause the Paleozoic peak in coal production** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Nelsen, M. P., DiMichele, W. A., Peters, S. E., Boyce, C. K.
  2016; 113 (9): 2442-2447
- **Arborescent lycopsid productivity and lifespan: Constraining the possibilities** *REVIEW OF PALAEOBOTANY AND PALYNOLOGY*
  Boyce, C. K., DiMichele, W. A.
  2016; 227: 97–110
- **Fossils** *OXFORD BIBLIOGRAPHIES IN EVOLUTIONARY BIOLOGY*
  Boyce, C. K.
  2015
- **THE ROLE OF CELLULOSE FIBERS IN GNETUM GNEMON LEAF HYDRAULICS** *INTERNATIONAL JOURNAL OF PLANT SCIENCES*
  Zwieniecki, M. A., Boyce, C. K.
  2014; 175 (9): 1054-1061
- **Evolution of a unique anatomical precision in angiosperm leaf venation lifts constraints on vascular plant ecology.** *Proceedings. Biological sciences / The Royal Society*
  Zwieniecki, M. A., Boyce, C. K.
  2014; 281 (1779): 20132829-?
- **Forest productivity and water stress in Amazonia: observations from GOSAT chlorophyll fluorescence** *PROCEEDINGS OF THE ROYAL SOCIETY B-BIOLOGICAL SCIENCES*
  Lee, J., Frankenberg, C., van der Tol, C., Berry, J. A., Guanter, L., Boyce, C. K., Fisher, J. B., Morrow, E., Worden, J. R., Asefi, S., Badgley, G., Saatchi, S.
  2013; 280 (1761)
- **Reduction of tropical land region precipitation variability via transpiration** *GEOPHYSICAL RESEARCH LETTERS*
  Lee, J., Lintner, B. R., Neelin, J. D., Jiang, X., Gentine, P., Boyce, C. K., Fisher, J. B., Perron, J. T., Kubar, T. L., Lee, J., Worden, J.
  2012; 39
- **OVULE FUNCTION AND THE EVOLUTION OF ANGIOSPERM REPRODUCTIVE INNOVATIONS** *INTERNATIONAL JOURNAL OF PLANT SCIENCES*

Leslie, A. B., Boyce, C. K.
2012; 173 (6): 640-648

- **THE PALEONTOLOGICAL CONTEXT OF ANGIOSPERM VEGETATIVE EVOLUTION** *INTERNATIONAL JOURNAL OF PLANT SCIENCES*
  Boyce, C. K., Leslie, A. B.
  2012; 173 (6): 561-568
- **Leaf fossil record suggests limited influence of atmospheric CO2 on terrestrial productivity prior to angiosperm evolution** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Boyce, C. K., Zwieniecki, M. A.
  2012; 109 (26): 10403-10408
- **Land use change exacerbates tropical South American drought by sea surface temperature variability** *GEOPHYSICAL RESEARCH LETTERS*
  Lee, J., Lintner, B. R., Boyce, C. K., Lawrence, P. J.
  2011; 38
- **Could land plant evolution have fed the marine revolution?** *PALEONTOLOGICAL RESEARCH*
  Boyce, C. K., Lee, J.
  2011; 15 (2): 100-105
- **The evolution and functional significance of leaf shape in the angiosperms** *FUNCTIONAL PLANT BIOLOGY*
  Nicotra, A. B., Leigh, A., Boyce, C. K., Jones, C. S., Niklas, K. J., Royer, D. L., Tsukaya, H.
  2011; 38 (7): 535-552
- **Structural and hydraulic correlates of heterophylly in Ginkgo biloba** *NEW PHYTOLOGIST*
  Leigh, A., Zwieniecki, M. A., Rockwell, F. E., Boyce, C. K., Nicotra, A. B., Holbrook, N. M.
  2011; 189 (2): 459-470
- **Impact of the hydraulic capacity of plants on water and carbon fluxes in tropical South America** *JOURNAL OF GEOPHYSICAL RESEARCH-ATMOSPHERES*
  Lee, J., Boyce, K.
  2010; 115
- **An exceptional role for flowering plant physiology in the expansion of tropical rainforests and biodiversity** *PROCEEDINGS OF THE ROYAL SOCIETY B-BIOLOGICAL SCIENCES*
  Boyce, C. K., Lee, J.
  2010; 277 (1699): 3437-3443
- **X-ray photoelectron emission spectromicroscopic analysis of arborescent lycopsid cell wall composition and Carboniferous coal ball preservation** *INTERNATIONAL JOURNAL OF COAL GEOLOGY*
  Boyce, C. K., Abrecht, M., Zhou, D., Gilbert, P. U.
  2010; 83 (2-3): 146-153
- **Carbon sources for the Palaeozoic giant fungus Prototaxites inferred from modern analogues** *PROCEEDINGS OF THE ROYAL SOCIETY B-BIOLOGICAL SCIENCES*
  Hobbie, E. A., Boyce, C. K.
  2010; 277 (1691): 2149-2156
- **"PROTOTAXITES WAS NOT A TAPHONOMIC ARTIFACT"** *AMERICAN JOURNAL OF BOTANY*
  Boyce, C. K., Hotton, C. L.
  2010; 97 (7): 1073-1073
- **The evolution of plant development in a paleontological context** *CURRENT OPINION IN PLANT BIOLOGY*
  Boyce, C. K.
  2010; 13 (1): 102-107
- **ANGIOSPERMS HELPED PUT THE RAIN IN THE RAINFORESTS: THE IMPACT OF PLANT PHYSIOLOGICAL EVOLUTION ON TROPICAL BIODIVERSITY** *ANNALS OF THE MISSOURI BOTANICAL GARDEN*
  Boyce, C. K., Lee, J., Feild, T. S., Brodribb, T. J., Zwieniecki, M. A.
  2010; 97 (4): 527-540

- **Angiosperm leaf vein evolution was physiologically and environmentally transformative** *PROCEEDINGS OF THE ROYAL SOCIETY B-BIOLOGICAL SCIENCES*
  Boyce, C. K., Brodribb, T. J., Feild, T. S., Zwieniecki, M. A.
  2009; 276 (1663): 1771-1776
- **Seeing the forest with the leaves - clues to canopy placement from leaf fossil size and venation characteristics** *GEOBIOLOGY*
  Boyce, C. K.
  2009; 7 (2): 192-199
- **How green was Cooksonia? The importance of size in understanding the early evolution of physiology in the vascular plant lineage** *PALEOBIOLOGY*
  Boyce, C. K.
  2008; 34 (2): 179-194
- **The fossil record of plant physiology and development—What leaves can tell us** *Paleontological Society Papers*
  Boyce, C. K.
  2008; 14: 133-146
- **Mechanisms of laminar growth in morphologically convergent leaves and flower petals** *INTERNATIONAL JOURNAL OF PLANT SCIENCES*
  Boyce, C. K.
  2007; 168 (8): 1151-1156
- **Devonian landscape heterogeneity recorded by a giant fungus** *GEOLOGY*
  Boyce, C. K., Hotton, C. L., Fogel, M. L., Cody, G. D., Hazen, R. M., Knoll, A. H., Hueber, F. M.
  2007; 35 (5): 399-402
- **Hydraulic design of pine needles: one-dimensional optimization for single-vein leaves** *PLANT CELL AND ENVIRONMENT*
  Zwieniecki, M. A., Stone, H. A., Leigh, A., Boyce, C. K., Holbrook, N. M.
  2006; 29 (5): 803-809
- **Patterns of segregation and convergence in the evolution of fern and seed plant leaf morphologies** *PALEOBIOLOGY*
  Boyce, C. K.
  2005; 31 (1): 117-140
- **The evolutionary history of roots and leaves** *Vascular transport in plants*
  Boyce, C. K.
  edited by Holbrook, N. M., Zweiniecki, M. A.
  Elsevier Sciences/Academic Press.2005: 479–499
- **Evolution of xylem lignification and hydrogel transport regulation** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Boyce, C. K., Zwieniecki, M. A., Cody, G. D., Jacobsen, C., Wirick, S., Knoll, A. H., Holbrook, N. M.
  2004; 101 (50): 17555-17558
- **Functional design space of single-veined leaves: Role of tissue hydraulic properties in constraining leaf size and shape** *ANNALS OF BOTANY*
  Zwieniecki, M. A., Boyce, C. K., Holbrook, N. M.
  2004; 94 (4): 507-513
- **Hydraulic limitations imposed by crown placement determine final size and shape of Quercus rubra L. leaves** *PLANT CELL AND ENVIRONMENT*
  Zwieniecki, M. A., Boyce, C. K., Holbrook, N. M.
  2004; 27 (3): 357-365
- **Chemical evidence for cell wall lignification and the evolution of tracheids in early Devonian plants** *INTERNATIONAL JOURNAL OF PLANT SCIENCES*
  Boyce, C. K., Cody, G. D., Fogel, M. L., Hazen, R. M., Alexander, C. M., Knoll, A. H.
  2003; 164 (5): 691-702
- **Hydraulic architecture of leaf venation in Laurus nobilis L.** *PLANT CELL AND ENVIRONMENT*
  Zwieniecki, M. A., Melcher, P. J., Boyce, C. K., Sack, L., Holbrook, N. M.

2002; 25 (11): 1445-1450

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  Boyce, C. K., Cody, G. D., Feser, M., Jacobsen, C., Knoll, A. H., Wirick, S.
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- **Evolution of developmental potential and the multiple independent origins of leaves in Paleozoic vascular plants** *PALEOBIOLOGY*
  Boyce, C. K., Knoll, A. H.
  2002; 28 (1): 70-100
- **Nondestructive, in situ, cellular-scale mapping of elemental abundances including organic carbon in permineralized fossils** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Boyce, C. K., Hazen, R. M., Knoll, A. H.
  2001; 98 (11): 5970-5974
- **Measurement of the threshold sensitivity of honeybees to weak, extremely low-frequency magnetic fields** *JOURNAL OF EXPERIMENTAL BIOLOGY*
  Kirschvink, J. L., Padmanabha, S., Boyce, C. K., Oglesby, J.
  1997; 200 (9): 1363-1368